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FOREST INSECT SURVEY

MODOC NATIONAL FOREST AND ADJACENT PRIVATE LANDS

SEASON OF 1950

By

E. T. Engen

Forest Insect Laboratory
29 Forestry Building, U.C.
Berkeley 4, California

November 20, 1950

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U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

FOREST INSECT SURVEY
MODOC NATIONAL FOREST AND ADJACENT PRIVATE LANDS
SEASON OF 1950

Submitted by:

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FOREST INSECT SURVEY

MODOC NATIONAL FOREST AND ADJACENT PRIVATE LANDS

SEASON OF 1950

By

E. T. Engen

FIELD EXAMINATION:

Personnel - Marius Wasbauer, Robert Stevens, Somers Merryman, and J. W. Bongberg, Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine, 29 Forestry Building, University of California, Berkeley 4, Calif.

Date - June 27 - July 16, 1950

Methods - Inventory of insect-killed trees on permanent sample plots and roadside sample strips, augmented by an aerial reconnaissance of the Warner Mountains, the Devil's Garden Area, and the Happy Camp Lava Beds Area.

AREAS EXAMINED:

Sample plot measurements were made throughout the virgin pine stands of the Modoc National Forest, and adjacent private lands, subdivided into reporting areas as shown on the appended map.

IMPORTANT FOREST INSECT CONDITIONS REVEALED BY THE SURVEY:

The forest insect survey indicated that current bark beetle activity in all areas is at a low endemic level. The total timber drain resulting from bark beetles and other forest insects is only slightly above the low annual rate of loss sustained for the past several years. By aerial reconnaissance, it was noted that current loss showed considerable increase in the fringe-type timber in the vicinity of Blue Mountain. This area should be watched for signs of continued heavy tree mortality and plans formulated for inclusion of this area in timber sales should loss rates approach epidemic proportions.

A ground check of the white fir stands in the North Warner Mountains revealed a marked increase in activity of the spruce budworm over conditions noted during 1949. Larval feeding was widespread, but confined to the new growth on lateral branches and tops of smaller trees. The total amount of defoliation was light, and no tree mortality resulting from budworm feeding was found.

The needleminer which was noted in the Devil's Garden Area during 1949 was not evident during this past season.

INSECTS RESPONSIBLE FOR TREE MORTALITY DURING 1949:

Bark beetles were again found to be the primary agents responsible for tree mortality during 1949. The association of tree-killing insects and host species is as follows:

Ponderosa pine: (1) The western pine beetle, Dendroctonus brevicomis Lec.

(2) The mountain pine beetle, Dendroctonus monticolae Ho[illegible].

(3) The California flathead borer, Melanophila californica, Van Dyke

(4) The pine engraver beetle, Ips spp.

Jeffrey pine: (1) The Jeffrey pine beetle, Dendroctonus jeffreyi, Hopk.

(2) The California flathead borer, Melanophila californica, Van Dyke

Sugar pine: (1) The mountain pine beetle, Dendroctonus monticolae, Hopk.

White fir: (1) The fir engraver beetle, Scolytus ventralis Lec.

(2) The fir roundheaded borer, Tetropium abietis Fall

(3) The spruce budworm, Choristoneura fumiferana (Clem.)

CHARACTER OF INSECT INFESTATIONS DURING 1949 AND 1950:

(1) 1949 Conditions

The over-all aspect of the 1949 loss was that of an endemic infestation. The bark beetle-caused loss occurred predominately in overmature, decadent-type trees scattered throughout the virgin forest areas. Except for Ips-killed loss in some of the cutover stands, group killing was not in evidence. Insect activity during 1949 resulted in a slight increase in tree mortality in all areas except the Devil's Garden country where a 50 percent decrease in volume of loss was recorded. The total loss of pine timber during 1949 in virgin stands of the Modoc National Forest and adjacent private lands is estimated at 8.75 million board feet. This loss is approximately 2.8 million board feet below the estimated drain during 1948, a result primarily of decreased beetle activity throughout 93,400 acres of lands in the Devil's Garden Area and cutting on 8,700 acres during the course of the year.

(2) 1950 Conditions

The forest insect survey crew completed ground measurements of insect-caused loss in mid-July; however, insect activity continues for several months beyond mid-summer, and current bark-beetle damage cannot be appraised accurately until a recruise of the sample plots is made during 1951. Partial loss records now available and impressions gained by aerial observations, however, indicate that current loss will not vary significantly from the 1949 observations and will approximate the average annual insect-caused drain that has been sustained in all areas for the past seven years. The pattern of loss for 1950 is one of an endemic character and the trees being attacked and killed are scattered high risk types. Aggressive bark-beetle activity noted in the vicinity of Washington Mountain and in the Pine Creek Basin during 1948 has shown no increase thus far during 1950.

TREND OF BARK BEETLE INFESTATIONS:

Measurements of insect-caused tree mortality on sample plots, and impressions of the general nature of the infestations as gained by ground and aerial reconnaissance, indicate that the current trend of loss is upward, slightly above the level sustained in 1948. With the exception of the decided decrease in loss in the Devil's Garden Area, the pine beetle infestation during 1949 has increased approximately 20 percent. Current infestations are not alarming and the amount of loss occurring is not excessive. However, a rising infestation, coupled with the availability of large numbers of high risk trees in the stand for beetles to attack and increase their numbers, creates a potential hazard for heavy tree mortality. A close watch over all areas to detect signs of approaching heavy loss will be maintained.

The relationship of the current bark beetle-caused loss to conditions of the past 10 years is shown graphically in Figure 1.

INSECT-CAUSED LOSS ON SAMPLE PLOTS DURING 1949:

The annual inventory of insect-caused tree mortality on sample plots is undertaken to determine the amount, kind and intensity of insect activity present in the forest, and to appraise the severity of infestations encountered. A summary of the number of trees killed, board feet volume of loss, and percent of stand killed, as measured on permanent sample plots totaling 4,340 acres in the National Forest and adjacent timberlands in 1949, is given in Table 1. As indicated by the Table, measured loss was fairly uniform and moderate over all areas sampled.

ESTIMATED INSECT-CAUSED LOSS IN VIRGIN STANDS DURING 1949:

An estimate of the total loss resulting from bark beetles and other forest insects on the Modoc National Forest and adjacent private lands is made by expanding the record of measured loss on sample plots to the remaining virgin forest stands of the entomological unit represented by those samples.

On the basis of measured plot loss for 1949, bark beetles were estimated to have destroyed 8,724,000 board feet of pine timber, or 0.25 percent of the virgin pine stand. A summary of estimated loss for 1949 on the entomological reporting areas of the Modoc National Forest and adjacent private timberlands is given in Table 2.

LOSS CONDITIONS IN CUTOVER RESERVE STANDS:

General reconnaissance throughout the cutover areas is used as a basis for detecting and appraising annual insect conditions, and with the exception of sampling on special study areas, no attempt is made to measure insect-caused loss in cutover stands on a quantitative sample-plot basis.

A majority of all reserve stands was noted to be exceptionally free of tree-killing infestations. Some localized centers of Ips killing in saplings and poles occurred in the recent cutover stands south of Canby, and in areas cut over during 1949 in the Stone Coal Unit of the Adin Area. It is not expected that this Ips-caused loss will continue, nor is there any apparent danger of spread to other adjacent lands.

Roney Flat Cutover: Adin Area

One of the first attempts in selective cuttings for management of ponderosa pine stands on the Modoc National Forest was made in the Roney Flat Area during 1938. The major objective of this selective cutting was to reduce the bark-beetle hazard of the area by a selective removal of all trees considered to be susceptible to attack by bark beetles. For the first few years following the cutting, the annual rate of insect-caused mortality in the reserve stand was materially reduced, but gradually, annual losses increased above the normal level of other stands treated in a similar manner. Sample plots were established in this cutover area, and annual measurements and studies were made of mortality rates in an attempt to uncover the underlying factors involved in this infestation. The sustained tree mortality in this cutover stand was found to be a result of bark-beetle populations breeding in unmerchantable and submarginal high risk trees left on the area during cutting. By 1946 the majority of these high-risk trees had been killed and the loss during 1947 dropped to 4.0 board feet per acre. However, loss records during 1948 and 1949 reflected the pressures of increasing bark beetle populations and current tree mortality on this area again approximates that of the surrounding virgin stands in the Adin Area.

Hog Lake Cutover: Happy Camp-Lava Beds Area

In the forest management plan for the Alturas Working Circle, a tract of timber in the Hog Lake Compartment of the Happy Camp-Lava Beds Area was put up for sale on a selective cutting basis whereby cutting would be limited to the removal of trees judged to be highly susceptible to insect attack. This timber sale was culminated in 1941, and during the season of 1942, 8.2 million board feet of timber was removed from four sections of land in the sale area. Since this timber sale was made for the specific purpose of gaining control of insect-caused losses in the stand, several sample plots were established in the sale area in order that the rate of loss subsequent to cutting could be compared to adjacent virgin areas. Eight years have now elapsed since cutting, and the objectives of the test have been fully met. The cumulative total loss on the test area for the eight years has amounted to 43 board feet per acre, whereas, cumulative losses have amounted to 309 board feet per acre on the adjacent virgin areas. Thus the reduction of insect-caused tree mortality resulting from the cutting amounted to 86 percent.

Dutch Flat Cutover: Adin Area

Following the large scale test of benefits obtained in control of bark beetles by the selective removal of high-risk trees from the Hog Lake Compartment of the Happy Camp-Lava Beds Area during 1942 (1), the principle of "risk marking" was incorporated in the selective cutting of the Dutch Flat Unit of the Adin Area. Subsequent tree mortality in this cutover stand was negligible until 1949 when loss rates again showed upward trends. Sample plots were established in the area and losses were compared to adjacent virgin stands. Results obtained from sample plot measurements showed considerable less loss in the cutover area, but a rate above that occurring on other areas cut on a "risk marking" basis.

INSECT CONTROL RECOMMENDATIONS:

The major purpose of the annual forest insect survey on the Modoc National Forest and adjacent private lands is to appraise the relative severity of insect infestations in all areas. In addition, the survey program is maintained on an annual basis for the detection of possible outbreaks of forest insect pests in order that control can be planned and initiated where needed, before infestations become widespread. Since no aggressive bark beetle or other insect infestations were found on the Modoc National Forest during this current season, direct control action is not needed. The general uniformity of measured loss in the virgin timberlands does not indicate any need for shifting current logging operations to specific areas in an attempt to gain control over high loss rates.

The report on insect conditions during 1949 (2) made mention of separate areas to be considered for early planning of sanitation-salvage cuttings in order to forestall possible heavy loss. It is still urged that these areas, Washington Mountain and the Pine Creek Basin, be included in timber sales planning, but current loss rates do not justify any immediate shift in the orderly program of cutting now being made in the Badger Unit.

Factors favoring the epidemics of the spruce budworm are not fully understood, and despite the presence of this potential forest destroyer throughout the fir stands of the Warner Mountains, control is not deemed necessary at this time. A close watch will be maintained over this infestation to detect future trends.

References

(1) Bongberg, J. W. Selected cutting for the prevention of timber loss caused by insects, Hog Lake Compartment, Happy Camp-Lava Beds Area. Modoc National Forest, California. Station report, Berkeley Forest Insect Laboratory, Berkeley, Calif. Jan. 1, 1943.

(2) Clark, E. C. Forest Insect Survey, Modoc National Forest, California and adjacent private lands, Season of 1949, Station report, Berkeley Forest Insect Laboratory, Berkeley, Calif. Feb. 23, 1950

Table 1. Pine Timber Killed by Bark Beetles on Sample Plots in Virgin Stands During 1949. Modoc National Forest and Adjacent Private Lands.

Entomological Unit	Sample Plots: Plot No.	Timb'd Acreage	Pine Stand: Hazard Rating	Tree Spp.	Volume M.b.m.	Pine Timber Killed During 1949: No. of Trees	Vol. b.m.	Vol. p/a	Percent of stand
Happy Camp-Lava Beds Area									
	MC-7	300	V	PP	2490	None			
Badger	RD-37	160	V	PP	760	3	2900	18.1	0.38
	RD-51	160	V	PP	1401	3	2690	16.8	0.19
	RD-52	160	V	PP	1636	5	1840	11.4	0.11
Happy Camp	RD-10	160	IV-V	PP	1850	2	2130	13.3	0.11
	Plot 7	160	III-IV	PP	1700	15	10300	64.4	0.60
	Plot 8	160	III-IV	PP	1700	11	6830	42.6	0.40
Timber Mtn.	RD-39	160	V	PP	360	2	2850	17.8	0.79
Area Totals		1420		PP	11897	41	29540	20.8	0.25
Devils Garden Area									
Weed Valley	RD-24	160	III	PP	1750	2	1410	8.8	0.08
	RD-25	160	III	PP	1970	3	4490	28.1	0.23
	RD-27	160	IV	PP	1430	5	1870	11.7	0.13
	Sec 18	640	IV	PP	7087	11	7030	10.9	0.10
Fletcher Cr.	RD-28	160	III	PP	2790	4	3720	23.3	0.13
	RD-29	160	III	PP	3550	1	180	1.1	0.005
	RD-34	160	IV	PP	2040	5	6280	39.2	0.31
	RD-48	80	IV	PP	1530	1	300	3.8	0.02
	RD-49	160	III	PP	3000	3	4410	27.6	0.15
	Sec 31	320	III	PP	6732	15	10130	31.6	0.15
Blue Mtn.	RD-26	160	IV	PP	1710	None			
	RD-32	80	IV	PP	480	2	1520	19.0	0.32
	RD-50	120	IV	PP	781	None			
Area Totals		2520		PP	34850	52	41340	16.4	0.12
Adin Area									
Stone Coal	LS-1	400	IV-V	PP	3046	22	15650	39.1	0.51
				JP	654	1	40	0.1	0.006
Area Total		400			3700	23	15690	39.2	0.42
Average of all reporting areas on Modoc National Forest				PP and JP				20.0	0.18

Table 2. Estimated Virgin Pine Timber Killed by Bark Beetles During 1949.
Modoc National Forest and Adjacent Private Lands.

Entomological Unit	Pine Type Acreage as of 1/1/50			Virgin Pine Stand		Pine Timber Killed During 1949			
	Virgin	Cutover	Total	Tree Spp.	Volume M.B.M.	No. of Trees	Vol. MBM	Vol. p.a.	% of Stand
Happy Camp-Lava Beds Area									
Badger	13965	42335	56300	PP	96414	490	332	23.8	0.34
Happy Camp	31020	26020	57040	PP	302994	1800	1244	40.1	0.41
Webb Butte	1000	64130	65130	PP	13147	23	19	19.3	0.14
Lava Beds	16990	39030	56020	PP	164125	462	361	21.2	0.22
Glass Mtn.	9795	49295	59090	PP	103885	277	208	21.2	0.20
				SP	11838	17	13	1.3	0.11
Timber Mtn.	22570	26460	49030	PP	50218	270	402	17.8	0.80
Area Totals	95340	247270	342610	PP	730783	3322	2566	26.9	0.35
				SP	11838	17	13	1.3	0.11
Devils Garden Area									
Weed Valley	24780		24780	PP	259870	470	327	13.2	0.12
Fletcher Cr.	55510	1930	57440	PP	706178	1554	1393	25.1	0.20
Blue Mtn.	13130		13130	PP	146898	328	248	18.9	0.17
Area Totals	93420	1930	95350	PP	1112946	2352	1968	21.0	0.18
Adin Area									
Dutch Flat	6780	7300	14080	PP	49232	197	148	21.7	0.30
				JP	14136	23	17	2.5	0.12
Stone Coal	14640	6300	20940	PP	83698	527	572	39.1	0.68
				JP	26514	71	53	3.6	0.20
Toms Creek	6850	22330	29180	PP	77330	288	240	35.0	0.31
				JP	19264	31	23	3.4	0.12
Likely	3360	23490	26850	PP	44382	148	124	36.9	0.28
				JP	14466	35	26	7.7	0.18
Rush Creek	7480	10770	18250	PP	39471	184	138	18.4	0.35
				JP	38432	104	78	10.4	0.20
Sweagert Fl.	2750	10720	13470	PP	20868	84	71	25.8	0.34
				JP	11676	24	18	6.5	0.15
Ash Creek	16480	2390	18870	PP	69997	261	196	11.9	0.28
				JP	52060	104	78	4.7	0.15
Willow Creek	20090	12370	32460	PP	60479	266	224	11.1	0.35
				JP	93052	198	149	7.4	0.16
Boyd Spg.	11320	9360	20680	PP	61191	277	208	18.4	0.34
				JP	37734	96	72	6.4	0.19
Juniper Cr.	7370	7170	14540	PP	52924	176	159	21.5	0.30
				JP	1016	3	2	0.3	0.20
Area Totals	97120	112200	209320	PP	559572	2408	2080	21.4	0.37
				JP	308350	689	516	5.4	0.17

Table 2. Cont'd

Entomological Unit	Pine Type Acreage as of 1/1/50			Virgin Pine Stand			Pine Timber Killed During 1949			
	Virgin	Cutover	Total	Tree Spp.	Volume M.B.M.		No. of Trees	Vol. MBM	Vol. p.a.	% of Stand
Big Valley Mountain Area										
White Horse	1910	48920	50830	PP	25332		44	66	34.6	0.26
				SP	13583		18	26	13.6	0.19
Widow Valley	9570	22970	32540	PP	117522		282	223	23.3	0.19
				SP	37190		45	67	7.0	0.18
Muck Valley	3100	8470	11570	PP	3334		9	10	3.2	0.31
				JP	891		3	2	0.6	0.22
Area Totals	14580	80360	94940	PP	146188		335	299	20.5	0.20
				SP	50773		27	93	6.4	0.18
				JP	891		3	2	0.6	0.22
Warner Mountain Area										
Bidwell Cr.	3280	2080	5360	PP	22809		33	39	11.9	0.17
Joseph Cr.	1940	1600	3540	PP	17032		35	36	18.6	0.21
Parker Cr.	8550	1330	9880	PP	83029		221	249	29.1	0.30
				JP	20575		33	39	4.6	0.19
Davis Cr.	6440	3210	9650	PP	68851		120	123	14.0	0.18
Cantrall Mill	13620	1600	15220	PP	47553		140	124	9.1	0.26
				JP	85963		165	138	10.1	0.16
Long Valley	11960	1260	13220	PP	104998		265	199	16.6	0.19
				JP	34631		47	52	4.3	0.15
Buck Creek	3860		3860	PP	38832		83	62	16.1	0.16
Lassen Creek	7490	3560	11950	PP	55660		162	122	16.2	0.22
Area Totals	57140	14640	71780	PP	438764		1059	954	16.7	0.22
				JP	141169		245	229	6.7	0.16
Total for above five reporting areas				PP	2988253		9476	7867	22.0	0.26
				SP	62611		44	110	5.2	0.18
				JP	450410		937	747	5.6	0.16
				TOTAL	3501274		10457	8724	24.4	0.25

Table 3. Pine Timber Killed by Bark Beetles During 1949 on Sample Plots in Reserve Stands. Modoc National Forest and Adjacent Private Lands.

Entomological Unit	Sample Plots: Plot No.	Timb'd Acreage	Pine Stand: Hazard Rating	Tree Spp.	Volume M.b.m.	Pine Timber Killed During 1949: No. of Trees	Vol. b.m.	Vol. p.a	Percent of stand
Happy Camp-Lava Beds Area									
Badger	RD-1	160	IV	PP	1009	4	2170	13.6	0.22
	RD-2	160	IV	PP	532	2	4220	26.4	0.79
	RD-33	160	V	PP	727	3	2970	18.5	0.41
Happy Camp	RD-42	128	IV	PP	857	None			
	RD-43	136	IV	PP	911	2	2710	19.9	0.30
	RD-44	160	IV	PP	1071	None			
	Plot 1	160	IV	PP	1133	None			
	Plot 2	160	IV	PP	1209	4	1510	9.5	0.12
	Plot 3	160	IV	PP	1050	2	620	3.9	0.06
	Plot 4	160	IV	PP	1279	2	1430	9.0	0.11
	Plot 5	160	IV	PP	874	None			
	Plot 6	95	IV	PP	756	2	970	10.2	0.13
Webb Butte	RD-41	160	IV	PP	783	7	1750	10.9	0.22
Glass Mtn.	RD-40	80	III	PP	441				
	RD-53	160	III	PP	448	5	770	4.8	0.17
	RD-31	160	V	PP	111	4	2440	15.2	2.19
	RD-54	160	IV	PP	776	3	920	5.8	0.12
Area Totals		2519		PP	13967	40	22480	8.9	0.16
Adin Area									
Rush Creek	RD-12	80	IV	PP	567	3	520	3.2	0.09
(Roney Flat)	RD-11	80	IV	PP	440	1	120	1.5	0.03
				JP	132	None			
	RD-8	80	IV	PP	414	6	1740	21.8	0.42
				JP	64	None			
	RD-9	128	IV	PP	457	2	5640	44.1	1.23
Dutch Flat	RD-60	160	IV	PP	536	7	2250	14.1	0.42
				JP	94	2	190	1.2	0.20
Area Totals		528		PP	2414	19	10270	19.4	0.42
				JP	290	2	190	0.4	0.06

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PINE LOSSES
MODOC NATIONAL FOREST, CALIF.

1934-1949

PONDEROSA PINE

1934-1940 Average of Happy Camp Lava Beds only

1940-1949 Average of entire Modoc National Forest

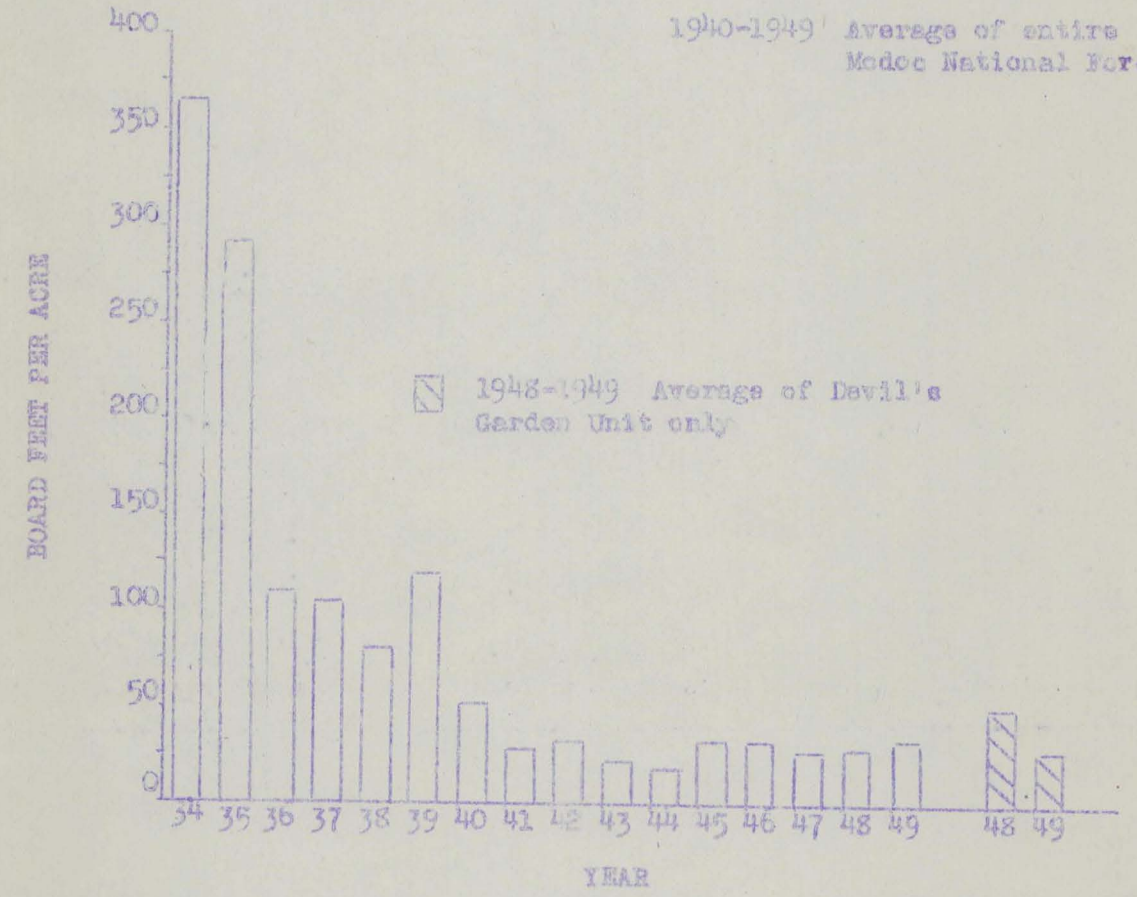
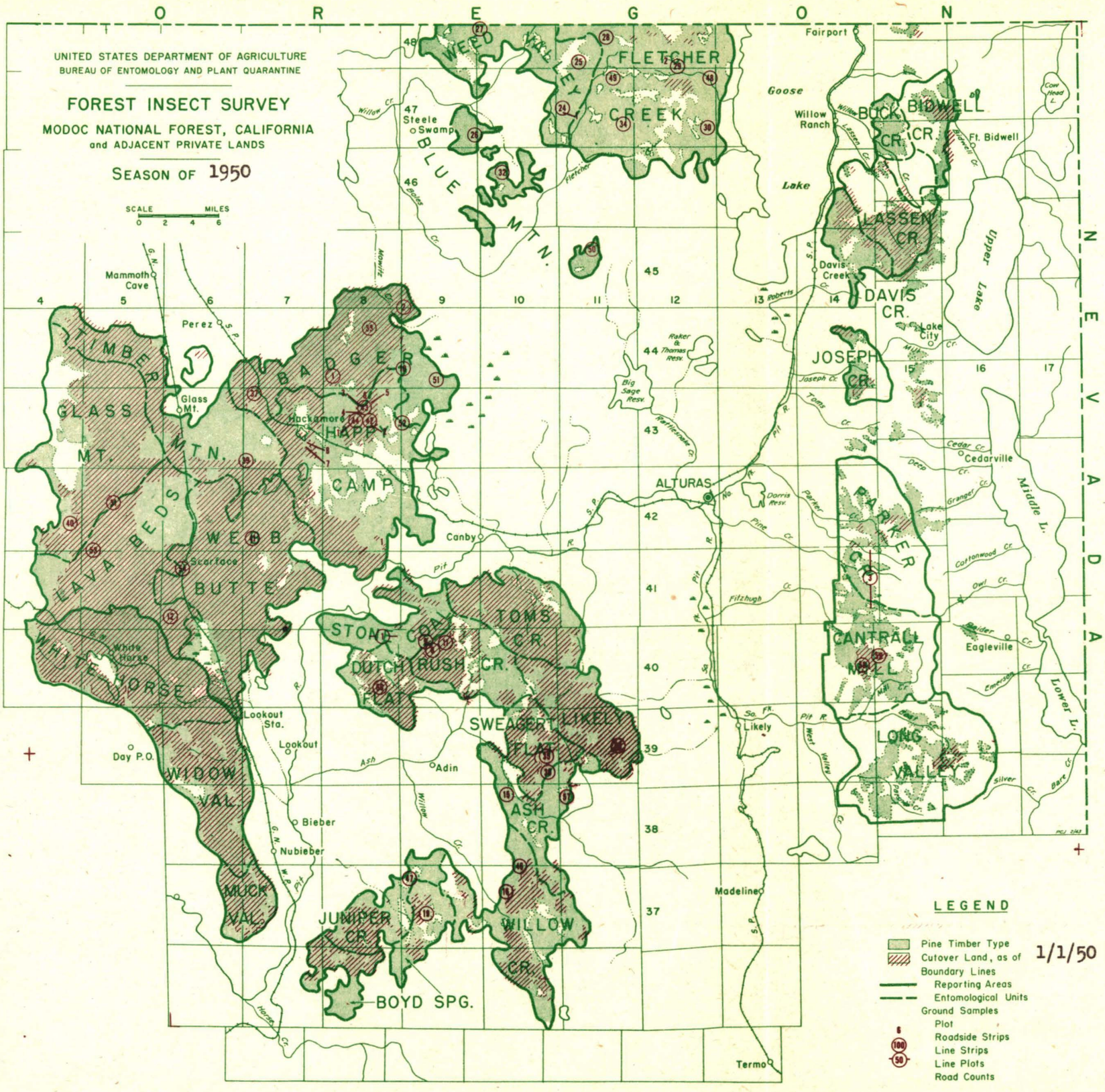


Figure 1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and ADJACENT PRIVATE LANDS
SEASON OF 1950
SCALE MILES
0 2 4 6
Fairport
Goose Lake
Willow Ranch
BUCK CR.
BIDWELL CR.
Ft. Bidwell
LASSEN CR.
Davis Creek
DAVIS CR.
Upper Lake
Lake City
JOSEPH CR.
Cedarville
Middle L.
Eagleville
Lower L.
PARKER CR.
CANTRALL MILL
LONG VALLEY
Likely
So. Fk.
Pit R.
West Valley
Madeline
ALTURAS
Canby
Adin
Lookout
Lookout Sta.
Day P.O.
Bieber
Nubieber
Mammoth Cave
Perez
Glass Mt.
Hackamore
Scarface
White Horse
Raker & Thomas Resv.
Big Sage Resv.
Dorris Resv.
WEED VALLEY
FLETCHER CREEK
BLUE MTN.
Steele Swamp
TIMBER MTN.
GLASS MT.
LAVA BEDS
BADGER
HAPPY CAMP
WEBB BUTTE
WHITE HORSE
STONE COAL
DUTCH FLAT
RUSH CR.
TOMS CR.
SWEAGER FLAT
LIKELY
ASH CR.
WIDOW VAL.
MUCK VAL.
JUNIPER CR.
WILLOW CR.
BOYD SPG.
Termo
LEGEND
Pine Timber Type
Cutover Land, as of 1/1/50
Boundary Lines
Reporting Areas
Entomological Units
Ground Samples
Plot
Roadside Strips
Line Strips
Line Plots
Road Counts